

The Honorable Spencer Abraham  
Secretary  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-1000

November 22, 2004

Dear Mr. Secretary,

In accordance with the provisions of the Methane Hydrate Research and Development Act of 2000, a Methane Hydrate Advisory Committee was created in November 2000 to advise you on a number of issues involving methane hydrate. The terms of the original committee members expired in May, 2003 and a new committee was appointed earlier this year. The new committee had its first meeting on September 21 and 22, 2004. This letter summarizes the Committee's discussions and provides you with its best judgment for sustaining and improving the ongoing activities that are so crucial to the development of our domestic energy resources.

Methane hydrate is an ice-like crystalline substance that forms when water and methane gas combine under conditions of relatively high pressure and low temperature. While the most common gas hydrate on earth is methane hydrate, other gases also form hydrates. These include hydrocarbon gases such as ethane and propane as well as non-hydrocarbon gases such as CO<sub>2</sub> and H<sub>2</sub>S. Methane hydrate occurs naturally in sediments associated with deep permafrost in Arctic environments and is widespread in the uppermost few hundred meters of slope and rise sediments in continental margins where the appropriate conditions of temperature and pressure exist.

The current Methane Hydrate Multi-Year R&D Program is managed by the Department of Energy and is a collaborative effort that includes the U.S. Geological Survey, the Minerals Management Service, the Naval Research Laboratory, the National Oceanic and Atmospheric Administration, the National Science Foundation, several corporations and numerous universities. In reviewing the progress of the Federal Methane Hydrate program, the committee noted that significant progress has been made in understanding the occurrence of methane hydrate, its potential as an energy resource, as well as its implications for offshore safety, environmental protection and global climate. The Committee made the following observations:

#### **Energy Resource Potential**

- Methane hydrate is part of the broader energy security issue. There is risk associated with dependence of foreign sources of natural gas.
- Significant progress is being made on addressing key methane hydrate development issues.
- There is a broad recognition that a "petroleum systems/earth systems" approach to methane hydrate is critical.
- Better resource definition is needed for methane hydrate.
- Production methods are needed that will allow methane hydrate to compete with other resources.

#### **Safety, Environmental and Climate Issues**

- A much better understanding is needed regarding the potential impact on slope stability posed by methane hydrate in marine sediments.

- Safety and environmental needs should progress in conjunction with other aspects of the methane hydrate program.
- The issue of methane hydrate and global climate needs additional study. Monitoring of important areas is needed. These areas include the Gulf of Mexico and convergent margins.

### **Importance of the Methane Hydrate R&D Program**

- There are advantages for the United States to be on the leading edge of methane hydrate research. The applications of technology development in this area go beyond methane hydrate and include oil sand development and seismic technology.
- The study of methane hydrate aids the understanding of deeper conventional oil and gas resources along with the underlying geology.
- The world is moving forward with methane hydrates. To enhance energy security there are specific areas in methane hydrate technology where the United States needs to maintain a leading position.

### **Advisory Committee Recommendations Regarding the Draft Strategic Plan for Gas Hydrate Research and Development**

The committee reviewed the draft ‘Methane Hydrate Multi-Year R&D Program Plan’ and supports the general direction set forth in the draft plan. The committee makes the following recommendations.

The Committee recognizes that there are significant differences between onshore Arctic and Deepwater gas hydrates in terms of occurrence, resource potential, safety issues, and potential environmental impacts. As a result of these differences, the strategic plan should distinguish the methodologies, timelines, and responsibilities that are most appropriate for each.

Gas hydrate resource assessment is further advanced in the Arctic onshore than in deepwater, and the commercial development of Arctic gas hydrate is likely to occur sooner than deepwater gas hydrates. The U.S. should play the leading role in the development of Arctic gas hydrate resource assessment, remote detection, characterization, production technology, and environmentally sound methods. Basic research on Arctic environmental issues is an area where the US program should take a leading role. A key goal of the Federal program is to determine whether gas hydrates can be a valid commercial resource for the United States. Once the resource assessment is deemed valid, industry will have the incentive to take the lead in subsequent efforts. Field experiments are essential but are inherently expensive and thus should be undertaken with strong international leveraging. Ensuring safe production of conventional oil and gas resources through hydrate-bearing zones is viewed as the responsibility of private industry.

The immediate impact of hydrates in deepwater areas involves the safety of conventional oil and gas facilities. The presence of hydrate has a substantial effect on sediment properties and hydrate decomposition results in significant changes in those properties. The US should play a leading role in basic research, technology development, and field experiments. In addition, a better understanding of the relationship of sensitive marine ecosystems associated with marine gas hydrates, the potential impact of future activities on these biological resources and on seafloor slope stability, and an assessment of the effectiveness of appropriate mitigation measures, needs to be better understood. To this end the Federal program (in conjunction with other agencies) should take a leadership role in the basic research, technology development, and field experiments to make this assessment. The US should take a leading role in the assessment of

deepwater gas hydrate resource potential, characterization, and remote sensing, but the development of production technology and field experiments will be best achieved over a longer time-frame and with strong international leveraging.

The role of methane hydrate in ocean chemistry, global climate change and the relationship of gas hydrates as part of the global carbon cycle are areas that require dedicated research and field experiments. These specific interdisciplinary activities will be best carried out by DOE through further strengthening and expanding its already established interagency collaborations.

A sustainable effort to train future scientists is viewed by the committee as an important component of current and future gas hydrate research. The committee strongly supports the establishment and/or expansion of graduate and post-graduate fellowship programs.

### **National Academies Report**

The committee reviewed the report by the National Research Council on the activities authorized under the Methane Hydrate Research and Development Act of 2000. The report reflects the extensive efforts undertaken by the NRC panel and includes many suggestions that will improve the nation's methane hydrate program. The Methane Hydrate Advisory Committee appreciates the interest and attention of the NRC to the issues of commercialization of methane hydrate, however there are a few areas where the Methane Hydrate Advisory Committee is not in full agreement with the recommendations made by the NRC.

However, this Advisory Committee has the following comments on an otherwise excellent report:

- The NRC panel may have misunderstood the charge given to the Methane Hydrate Advisory Committee by the enabling legislation, and the proposals for the role of committee members are in conflict with the current committee charter.
- It appears that the NRC failed to distinguish between the Committee's 2002 report to Congress and the appendix of that report.
- The NRC did not recognize the publications and public release of information that the DOE is responsible for.
- The interagency contributions to specific projects were apparently not evaluated, which may have projected a negative bias in the NRC evaluations of the DOE contribution.
- The NRC recommendations for more review and oversight of industry projects could have a negative impact on industry involvement, and fails to recognize the current DOE oversight process. The NRC committee also did not recognize that some of the DOE sponsored projects already have a scientific review process.

To summarize, the past four years has seen an impressive progress in Methane Hydrate R&D under DOE in a lead role in this multi-agency effort. The Committee members, in an advisory role, are excited to be a part of the ongoing effort to develop this indigenous natural energy source for the nation.

Sincerely,

Arthur H. Johnson, Chair  
Methane Hydrate Advisory Committee

Attachment

Attachment

**Membership of the Methane Hydrate Advisory Committee**

Peter Brewer  
Monterey Bay Aquarium Research Institute

Richard Charter  
Environmental Defense

Stephen Holditch  
Schlumberger Technology Corp.

Arthur Johnson  
Hydrate Energy International

Emrys Jones  
ChevronTexaco

Miriam Kastner  
Scripps Institution of Oceanography  
University of California, San Diego

Devinder Mahajan  
Brookhaven National Laboratory

Keith Millheim  
Anadarko Petroleum Corporation

Harry Roberts  
Louisiana State University

Robert Woolsey  
University of Mississippi